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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/713,017	11/17/2003	Shaw Voon Wong	WONG3019/JEK	9735
23364 7590 05/18/2007 BACON & THOMAS, PLLC 625 SLATERS LANE FOURTH FLOOR ALEXANDRIA, VA 22314			EXAMINER BUSS, BENJAMIN J	
			ART UNIT 2129	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/713,017	Applicant(s) WONG ET AL.	
	Examiner Benjamin Buss	Art Unit 2129	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 3/20/2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 9-10 and 12-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9-10 and 12-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11/17/2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office Action is in response to an AMENDMENT entered 3/20/2007 for the patent application 10/713,017 filed on 11/17/2003. The Office Action of 9/20/2006 and 2/1/2006 are fully incorporated into this Office Action by reference. Claims 9-10 and 12-17 are pending.

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Requirement under 37 CFR 1.105

Applicant and the assignee of this application are required under 37 CFR 1.105 to provide the following information that the examiner has determined is reasonably necessary to the examination of this application.

- 10 - In response to this requirement, please provide a copy of each of the following items of art referred to in the specification where it states: "has been modeled successfully with artificial neural networks and fuzzy reasoning, and promising results **have been shown in prior-arts by the inventor**" [0009], emphasis added.
- 15 - In response to this requirement, please provide copies of each publication which any of the applicants authored or co-authored and which describe the disclosed subject matter of the pending claims.
- 20 - In response to this requirement, please state the specific improvements of the subject matter in claims 9 and 15 over the disclosed prior art and indicate the specific elements in the claimed subject matter that provide those improvements. For those claims expressed as means or steps plus function, please provide the specific page and line numbers within the disclosure which describe the claimed structure and acts.
- 25 In responding to those requirements that require copies of documents, where the document is a bound text or a single article over 50 pages, the requirement may be met by providing copies of those pages that provide the particular subject matter indicated in the requirement, or where such subject matter is not indicated, the subject matter found in applicant's disclosure.

The fee and certification requirements of 37 CFR 1.97 are waived for those documents submitted in reply to this requirement. This waiver extends only to those documents within the scope of this requirement under 37 CFR 1.105 that are included in the applicant's first complete communication responding to this requirement. Any supplemental replies subsequent to the first communication responding to this requirement and any information

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disclosures beyond the scope of this requirement under 37 CFR 1.105 are subject to the fee and certification requirements of 37 CFR 1.97.

The applicant is reminded that the reply to this requirement must be made with candor and good faith under 37 CFR 1.56. Where the applicant does not have or cannot readily obtain an item of required information, a statement that the item is unknown or cannot be readily obtained may be accepted as a complete reply to the requirement for that item.

This requirement is an attachment of the enclosed Office action. A complete reply to the enclosed Office action must include a complete reply to this requirement. The time period for reply to this requirement coincides with the time period for reply to the enclosed Office action.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 12 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Specifically, claim 12 is dependent upon cancelled claim 11. As such, it is not clear if claim 12 is intended to depend on claim 9 or claim 10. Examiner has interpreted claim 12 as depending on claim 9 for the purposes of examination below.

Response to Arguments

Applicant's arguments, see pages 5-6, filed 2/20/2007 and entered 3/20/2007, with respect to the rejection of claim 9 as being indefinite have been fully considered and are persuasive. The rejection of claim 9 under 35 U.S.C. §112, second paragraph has been withdrawn.

Claim Rejections - 35 USC § 103

Response to Arguments

Applicant's arguments with respect to claims 9-10 and 12-17 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

5 (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10 Claims 9 and 12-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Wong**_{June2002} ("A fuzzy logic based expert system for machinability data-on-demand on the Internet") and **Takagi** (USPN 5,168,549).

Independent Claim 9:

Wong_{June2002} teaches:

- 15 - means operative in response to input data of a workpiece, the input data comprising workpiece characteristic data including at least a material type and hardness of the workpiece (p57-65 especially "speed [of cut] and feed [rate] are selected according to tool-workpiece material combination, depth of cut, and finishing condition" §1 or "user to enter the inputs, they are tool type, workpiece material hardness and depth of cut" §4 or "covers all materials for all types of possible machining process with all possible types of tool" §6 or Figure 2);
- 20 - means of performing fuzzification of said input data to produce fuzzy input data (p57-65 especially Figure 3: "fuzzification");
- an inference component operative to produce fuzzy output data from said fuzzy input data, the inference component including fuzzy control means for applying a set of predefined fuzzy rules to said fuzzy input data as to produce said fuzzy output data (p57-65 especially Figure 3: "Inference Mechanism" and "Rule Base"), wherein the fuzzy output data comprises machining conditions including at least cutting speed and at least one of depth of cut and feed rate data (p57-65 especially "speed [of cut] and feed [rate] are" §1 or Figure 3: "Outputs" and "Cutting Speed" and "Feed Rate" or Figure 4: "Recommended Cutting Speed" and "Recommended Feed Rate" and "Depth of Cut" or Figure 5: "Cutting Speed" and "Depth of Cut" and "Hardness");
- 25
- 30

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- means of performing defuzzification of said output data to produce crisp output data (p57-65 especially "Defuzzification" Figure 3); and
- means of conveying said crisp output data to said machining environment (p65-67 especially "can be integrated with CAM and CIM systems" §6 or Figure 4 or "Machining operators and design engineers can obtain most up-to-date and first hand data virtually from anywhere" §6 or "users are expected to revisit the site to collect or seek more machinability data for different conditions" §5).

Wong_{June2002} fails to teach:

- the inference component including a multilayer neural network.

Takagi teaches:

- an inference component operative to produce fuzzy output data from fuzzy input data, the inference component including a multilayer neural network and fuzzy control means for applying a set of predefined fuzzy rules to fuzzy input data as to produce said fuzzy output data (C1-11 especially "neural network model was learned 5,000 times to obtain the fuzzy number A^s of the IF part" C8L10-20 or "neural network model at step 5 is used as the THEN part model for inference rule 1 ... neural network model with (x_2, x_3) inputs is used as the THEN part. The resulting fuzzy model" C8L35-68 or "membership functions of fuzzy inference rules are determined using the learning algorithm of the neural network" C9L20-56 or C9L56-C10L10).

Motivation:**Wong**_{June2002} and **Takagi** are from the same field of endeavor, fuzzy inferences of membership functions.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of **Wong**_{June2002} by including using a neural network in inferring the fuzzy membership functions as taught by **Takagi** for the benefit of being capable of coping with the inference problem at high speed even it the problem is non-linear (**Takagi** C3L10-35).

Independent Claim 15:**Wong**_{June2002} teaches:

- means operative in response to input data of a workpiece, the input data comprising workpiece characteristic data including at least material type and hardness of the workpiece and depth of cut data

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(p57-65 especially "speed [of cut] and feed [rate] are selected according to tool-workpiece material combination, depth of cut, and finishing condition" §1 or "user to enter the inputs, they are tool type, workpiece material hardness and depth of cut" §4 or "covers all materials for all types of possible machining process with all possible types of tool" §6 or Figure 2);

- 5 - an inference component operative to produce output data according to said input data (p57-65 especially Figure 3: "Inference Mechanism" and "Rule Base"), the output data comprising machining condition data including at least cutting speed data (p57-65 especially "speed [of cut] and feed [rate] are selected" §1 or Figure 3: "Outputs" and "Cutting Speed" or Figure 4: "Recommended Cutting Speed" or Figure 5: "Cutting Speed");
- 10 - means of conveying said output data to said machining environment (p65-67 especially "can be integrated with CAM and CIM systems" §6 or Figure 4 or "Machining operators and design engineers can obtain most up-to-date and first hand data virtually from anywhere" §6 or "users are expected to revisit the site to collect or seek more machinability data for different conditions" §5).

Wong_{June2002} fails to teach:

- 15 - the inference component including a multilayer neural network, the multilayer neural network comprising a network of summation neurons and product neurons.

Takagi teaches:

- an inference component including a multilayer neural network operative to produce output data from input data, the multilayer neural network comprising a network of summation neurons and product neurons
- 20 (C1-11 especially "neural network model was learned 5,000 times to obtain the fuzzy number A^s of the IF part" C8L10-20 or "neural network model at step 5 is used as the THEN part model for inference rule 1 ... neural network model with (x_2, x_3) inputs is used as the THEN part. The resulting fuzzy model" C8L35-68 or "membership functions of fuzzy inference rules are determined using the learning algorithm of the neural network" C9L20-56 or C9L56-C10L10 or Figure 9 or Figure 8 or Figure 4, including the associated
- 25 discussion in the disclosure for each figure).

Motivation:

Wong_{June2002} and **Takagi** are from the same field of endeavor, fuzzy inferences of membership functions.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the

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teachings of **Wong**_{June2002} by including using a neural network in inferring the fuzzy membership functions as taught by **Takagi** for the benefit of being capable of coping with the inference problem at high speed even if the problem is non-linear (**Takagi** C3L10-35).

5 **Claim 12:**

Takagi teaches:

- wherein said multilayer neural network comprises a network of summation neurons and product neurons (C1-11 and especially Figure 9 or Figure 8 or Figure 4, including the associated discussion in the disclosure for each figure).

10

Claims 13 and 16:

Wong_{June2002} teaches:

- wherein said input data further comprises tool characteristic data and machining condition data (p57-65 especially "speed [of cut] and feed [rate] are selected according to tool-workpiece material combination, depth of cut, and finishing condition" §1 or "user to enter the inputs, they are tool type, workpiece material hardness and depth of cut" §4 or "covers all materials for all types of possible machining process with all possible types of tool" §6 or Figure 2).

15

Claims 14 and 17:

20 **Wong**_{June2002} teaches:

- wherein said input data further comprises cutting speed data, feed rate data, tool material data, and depth of cut data (C1-11 especially "speed [of cut] and feed [rate] are selected according to tool-workpiece material combination, depth of cut, and finishing condition. These speed and feed values are just good starting estimates" §1 or "showed the feasibility of incorporating depth of cut as one of the continuous parameters required to determine the cutting speed" §1 or "Optimization of the fuzzy model was also carried out using different fuzzy rules" §1 or "user to enter the inputs, they are tool type, workpiece material hardness and depth of cut" §4 or "covers all materials for all types of possible machining process with all possible types of tool" §6 or Figure 2 or Figure 5 or Appendix A or Table 8 or Table 9; *Examiner*

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points out that it would have been well known in the art at the time of the invention to have a feedback loop which would input the actual values of the controlled variables back into the control system).

Claim Rejections - 35 USC § 103

- 5 Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Wong**_{June2002} ("A fuzzy logic based expert system for machinability data-on-demand on the Internet") and **Takagi** (USPN 5,168,549) in view of **Wong**_{Feb2002} ("Development of genetic algorithm-based fuzzy rules design for metal cutting data selection").

Claim 10:

- 10 The combination of **Wong**_{June2002} and **Takagi** fails to teach:
- wherein said fuzzy rules are optimized according to a genetic algorithm.

Wong_{Feb2002} teaches:

- wherein said fuzzy rules are optimized according to a genetic algorithm (p1-12 especially §4 or Figure 1).

Motivation:

- 15 **Wong**_{Feb2002} and the combination of **Wong**_{June2002} and **Takagi** are from the same field of endeavor, fuzzy control. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the combined teachings of **Wong**_{June2002} and **Takagi** by optimizing the fuzzy rules with a genetic algorithm as taught by **Wong**_{Feb2002} for the benefit of using a popular tool which has been used to effectively find optimal solutions for a variety of problems to replace the tedious process of trial and error for better
- 20 combination of fuzzy rules (**Wong**₂₀₀₀ "Optimization of fuzzy rules design using genetic algorithm" §1).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- **Wong**₂₀₀₀ ("Optimization of fuzzy rules design using genetic algorithm")
- 25
- Hirai (USPN 5,815,400)
 - Kawamura (USPN 6,456,989)
 - Shin (USPN 6,560,498)
 - Erkens (USPN 5,804,940)

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- Unno (USPN 5,473,532)

Claims 9-10 and 12-17 are rejected.

5 **Correspondence Information**


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Benjamin Buss whose telephone number is 571-272-5831. The examiner can normally be reached on M-F 9AM-5PM.

10 If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Vincent can be reached on 571-272-3080. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

15 Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Benjamin Buss
Examiner
Art Unit 2129

BB


DAVID VINCENT
SUPERVISORY PATENT EXAMINER